

1 10. The combination of claim 1 wherein said
2 radiant burner comprises a supported metal fiber
3 material consisting essentially of an alloy containing
4 principally iron, chromium, and aluminum and smaller
5 quantities of yttrium, silicon, and manganese, said
6 alloy having extended life at operating temperatures up
7 to 2000°F.

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10 11. The combination of claim 1 wherein said
11 radiant burner is configured to direct radiation at an
12 included angle of radiation between 45-180 degrees.

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15 12. The combination of claim 1 wherein said
16 radiant burner has a hemispherical shape.

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19 13. The combination of claim 1 wherein said
20 radiant burner has surface temperatures ranging from
21 1500°F to 1900°F, in operation.

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1 14. The combination of claim 1 wherein said
2 radiant burner has an operating combustion intensity
3 typically ranging from 150,000 btu/ft²/h to
4 350,000 btu/ft²/h, wherein the combustion intensity is
5 defined as the higher heating value of the fuel
6 combusted divided by the permeable radiant burner
7 surface area.

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10 15. The combination of claim 1 wherein said
11 radiant burner has an operating excess air ratio
12 typically ranging from 30% to 100%, wherein the excess
13 air ratio is defined as percent combustion air in
14 excess of the stoichiometric amount required for
15 complete combustion of the burner fuel.

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1 16. Endothermic catalytic reaction
2 apparatus, comprising
3 a) a combustion chamber,
4 b) a tubular reaction chamber having two
5 generally tubular legs extending in generally parallel,
6 spaced apart relation within the combustion chamber,
7 c) catalyst within said reaction chamber
8 for reacting with a hydrocarbon and steam received
9 within the reactor chamber, to produce hydrogen and
10 carbon dioxide,
11 d) a generally tubular radiant burner
12 within the combustion chamber and extending in
13 generally parallel relation to at least one of said
14 legs, said burner spaced from said legs,
15 e) said two legs having axes, and said
16 tubular burner having an axis which is spaced in offset
17 relation to a plane defined by said leg axes.

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20 17. The combination of claim 16 wherein said
21 burner axis is approximately equidistant from said leg
22 axes.

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